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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,568	08/07/2006	Takatomo Yamaguchi	127569	9258
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OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850			EXAMINER CHEN, KEATH T	
			ART UNIT 1792	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/574,568

Applicant(s)

YAMAGUCHI ET AL.

Examiner

Keath T. Chen

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6,8-15 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6,8-15 and 17-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 November 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

The amendment of drawing (Figs. 15 and 16), the amendment of specification, and the amendment of claims filed on 11/27/2007, in response to the first office action (06/07/2007), amending claims 1, 2, 6, 8, 10-13, and 15; canceling claims 4, 5, 7, and 16; and adding claims 19-27; are acknowledged and will be addressed below.

Specification

1. The disclosure is objected to because of the following informalities: [0065] “the opening 20b is housed in the center of the opening 20b” (self reference).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 10, 13, and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 10, 13, and 27 recite “the support columns ... run over outer circumferences of the ring-like plates” which is not possible from the limitation of parent claims “ring-like plates ... surround the ... support columns”.

3. Claims 10, 13, and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 10, 13, and 27 recite "the support columns ... run over outer circumferences of the ring-like plates" which contradicts the limitation of parent claims "ring-like plates ... surround the ... support columns".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 11, 15, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiji et al. (JP 04-002118, and English translation, hereafter '118), in view of by Kobori et al. (US 5743967, hereafter '967).

'118 teaches some limitations of:

Claim 1: A substrate processing apparatus (fig. 1, #1), comprising: a substrate holder (wafer board #7) capable of holding plural substrates; a processing chamber (inside of outer tube

#2) which houses the substrates held by the substrate holder; and a heater (not shown, English translation, page 4, 1st paragraph), which heats the processing chamber; wherein the substrate holder includes: at least three support columns (Fig. 5, four columns available) provided substantially vertically; plural substrate mounting portions (grooves #9, Figs. 2, 7, or 8) which mount the plural substrates substantially horizontally at a predetermined interval, the substrate mounting portions being provided at multi-stages on the support columns so as to protrude from the support columns (the portions between grooves #9 protrude from the column relative to the grooves); plural ring-like plates (ring-shape baffle plate #30, Fig. 5) which surround the at least three support columns, are provided at multi-stages on the support columns, and are provided substantially horizontally at a predetermined interval with respect to the substrates supported on the substrate mounting portions (see Fig. 1 or 2, substrates and ring-like plates interleave).

Claim 11: A substrate processing apparatus, comprising: a substrate holder capable of holding plural substrates; a processing chamber which houses the substrates held by the substrate holder; and a heater which heats the processing chamber; wherein the substrate holder includes: at least three support columns provided substantially vertically; and plural ring-like plates which surround the at least three support columns, are provided at multi-stages on the support columns, and are provided substantially horizontally at a predetermined interval (same as claim 1 above) with respect to the substrates held by the substrate holder (see Fig. 1 or 2, substrates and ring-like plates interleave at equal separation).

Claim 15: A substrate holder (wafer board #7) capable of holding plural substrates, comprising: at least three support columns (Fig. 5, four columns available) provided substantially vertically; plural substrate mounting portions (grooves #9, Figs. 2, 7, or 8) which mount the

plural substrates substantially horizontally at a predetermined interval, the substrate mounting portions being provided at multi-stages on the support columns, so as to protrude from the support columns (the portions between grooves #9 protrude from the column relative to the grooves); and plural ring-like plates (ring-shape baffle plate #30, Fig. 5) which surround the at least three support columns, are provided at multi-stages on the support columns, and provided substantially horizontally at a predetermined interval with respect to the substrates supported on the substrate mounting portions (see Fig. 1 or 2, substrates and ring-like plates interleave).

Claim 17: A substrate holder capable of holding plural substrates, comprising:
at least three support columns provided substantially vertically; and plural ring-like plates which surround the at least three support columns, are provided at multi-stages on the support columns, and are provided substantially horizontally at a predetermined interval (same as claim 1 above) with respect to the substrates held by the substrate holder (see Fig. 1 or 2, substrates and ring-like plates interleave).

‘118 does not teach the other limitations of claim 1, 11, 15, and 17:

Inner circumferential surfaces of the ring-like plates, the inner circumferential surfaces being opposite to the support columns, are notched on a periphery of the support columns.

‘967 is an analogous art in the field CVD, particularly in enhancing the uniformity of film thickness distribution (col. 2, lines 29-32, ‘118, English abstract). ‘967 teaches notch (cutouts) in the ring (Fig. 4A) near the support columns (boat pillars) for the purpose of reducing non-uniformities (col. 5, lines 56-60).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '967 with '118. Specifically, to have applied notch in the inner circumferential surface of the ring near (or on) the support column, as taught by '967, to the substrate holder in Fig. 5 of '118, for the purpose of reducing non-uniformities (col. 5, lines 56-60).

'967 also teaches the method of claim 18 (by using the apparatus of the above combination for claim 1):

A method of manufacturing a semiconductor device: mounting the substrates on the substrate mounting portions of the substrate holder (col. 2, lines 60-61); carrying the substrates mounted on the substrate mounting portions of the substrate holder into the processing chamber (col. 2, lines 61-63); heating the processing chamber by the heater (col. 6, lines 63-64); and supplying the processing gas to the heated processing chamber (col. 6, lines 61-63), thereby processing the substrate.

5. Claims 2, 6, and 19-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over '118 and '967, further in view of Minami et al. (JP 2001-168175, hereafter '175).

'118 and '967, together, teach all limitations of claim 1, as discussed above.

'118 and '967, together, do not teach the limitation of:

Claim 2: The substrate mounting portions are columnar shape or approximately semi-columnar shape.

Claim 6: Tips of the substrate mounting portions are rounded or chamfered.

'175 is an analogous art in the field substrate holder, particularly in heat treatment of semiconductor wafers (English translation of '175, [0006]; '967, Fig. 1 on boat and claim 1 on "uniformity" work requires attention to heat induced non-uniformity). '175 teach the use of wafer support rods (Fig. 5, #12) with rounded tips to have a smooth contact with wafer ([0059]) to effect controlling of slip generation ([0062]).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '175 with '118 and '967. Specifically, to have used rod shape tray, as taught by '175, as substrate mounting portion to the substrate support columns (#10) in Fig. 5 of '118, for the purpose of reducing the thermal slip, with a reasonable expectation of success.

'118 and '967, together, also teach all limitations of claims 11 and 15, as discussed above.

As the rod shape tray taught by '175 is smaller than the support column ('175, Fig. 5), and the cutouts is about the size of the support column ('967, #402, Fig. 4A) or larger ('967, col. 4, lines 64-65), the above combination would have met the limitations of:

Claims 19 and 24: An open width of the notch (equal or larger than support columns) is larger than a width of the substrate mounting portion (smaller than the support columns).

Claims 20, 22, and 25: An open width of the notch is larger than an outside diameter of the support columns ('967, col. 4, lines 64-65).

Claims 21, 23, and 26: The substrate the notch comprises: a fitting portion as a hole into which the support columns is fitted; and an opening which opens the fitting portion to the inner circumferential direction of the ring-like plate (when the cutouts is large enough to touch the periphery of the support column).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over '118, '967 and '175, further in view of Osaka et. al. (US 20020070095, hereafter '095).

'118, '967 and '175, together, teach all limitations of claims 2, as discussed above.

'967 and '175, together, do not teach the limitation of claim 3:

The substrate mounting portions are inclined downward toward an inside of the ring-like plates in a diameter direction.

'095 is an analogous art in the field of boat (Fig. 1) for semiconductor manufacturing apparatus (title), particularly in solving the problem of particle clung to the back side of the substrate ([0009], lines 1-4). '095 teaches the use of tapered mounting surface (Fig. 3A, #99) for the purpose to prevent the particles from clinging to the backs of wafers ([0198], lines 7-11).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '095 with '118, '967 and '175. Specifically, to have inclined the rod shape tray, as taught by '095, as substrate mounting portion in the above combination in Fig. 5 of '118, for the purpose of preventing the particle clinging, with a reasonable expectation of success.

7. Claims 8-9, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over '118 and '967, further in view of Ishii (US 5820683, hereafter '683).

'118 and '967, together, teach all limitations of claims 1 and 11, as discussed above.

'118 and '967, together, do not teach the limitation of claims 8 and 12:

The support columns are composed into an approximately semi-columnar shape, and the substrate mounting portions are protruded on a chord side of the support columns.

'683 is an analogous art in the field of semiconductor wafer boat, particularly in solving the problem of temperature induced slip (col. 1, col. 47-54). '683 teaches the use of semi-columnar support columns (Fig. 5, semi-cylindrical prop, col. 3, lines 9-10) in place of three support columns (Fig. 1-2, prop #14-16, col. 1, lines 27-32) which tends to generate slips (col. 1, lines 56-60), in order to provide larger contact area (through the ring #36) with wafer in order to reduce the slip formation.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '683 with '118 and '967. Specifically, to have changed the circular support columns ('118, #10 in Fig. 5) to the semi-cylindrical support columns, as taught by '583, for the purpose of reducing slips.

For claims 9 and 14, '967 teaches notch (cutouts) in the ring (Fig. 4A) near the support columns (boat pillars) for the purpose of reducing non-uniformity (col. 5, lines 56-60), as discussed in claim 1 rejection above. Furthermore, the notch is scooped out at the chord side of the support column (note, both the inner and the outer arcs of 35A-D in Fig. 5 of '683 are chords); therefore, the limitation of claim 9 and 14 are met:

On the chord side, an inside thereof in a diameter direction of the ring-like plates is scooped out.

Response to Arguments

Applicant's arguments filed 11/27/2007 have been fully considered and **some are persuasive:**

8. In regarding to drawing objection, see item I of page 11, applicant's amendment overcomes the objection.

9. In regarding to specification objections, see item II of page 12, applicant amendments overcome some objections. However, an objection remains as discussed above.

10. In regarding to claim objection to claim 8, see item III of page 12, applicant amendment overcomes the objection.

The other applicant's arguments are not persuasive:

11. In regarding to 102(b) rejections of claims 1, 4, 10, 11, 13, 15-18 based on Kobori ('967), see pages 12-14, applicant's argument is that amended claims with new limitation "plural ring-like plates which surround the ... support columns" overcome '967 reference. The arguments in the new limitation are unconvincing in view of newly cited '118. However, claims 11 and 17 have this limitation and were not amended, for this reason the current action is made non-final.

12. In regarding to 103(a) rejections of various claims (item V, page 14-16), applicant's argument is that the secondary references do not overcome the limitation "plural ring-like plates which surround the ... support columns". Since the claim amendment requires a new primary

reference ('118), as discussed in the claim rejection above, the argument against these secondary references is irrelevant.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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MICHAEL CLEVELAND
SUPERVISORY PATENT EXAMINER